

**WHAT IS CLAIMED IS:**

1. A method for fabricating a semiconductor device, comprising of the steps of:
  - a) forming a compound semiconductor layer containing Si and Ge above a semiconductor substrate;
  - b) removing part of the compound semiconductor layer to form a trench;
  - c) performing heat treatment on a surface portion of the trench;
  - d) oxidizing at least part of the surface portion of the trench to form a thermal oxide film; and
  - e) filling the trench with an insulator to form a trench isolation including the thermal oxide film and the insulator.
2. The method of claim 1, wherein in the step c), the heat treatment is performed under vacuum.
3. The method of claim 1, wherein in the step c), the heat treatment is performed in a non-oxygen atmosphere.
4. The method of claim 1, further comprising after the step a), the step of epitaxially growing an Si layer on the compound semiconductor layer.
5. The method of claim 1, wherein in the step a), the compound semiconductor layer is provided on the semiconductor substrate with an insulating layer interposed therebetween.
6. The method of claim 1, wherein the heat treatment is performed at a temperature

ranging from 700 °C to 1050 °C.

7. The method of claim 1, wherein in the step d), part of the compound semiconductor layer extending inward from the surface thereof located at the trench to a distance of 30 nm or less.

8. The method of claim 1, wherein in the step c), an upper portion of the compound semiconductor layer is subjected to heat treatment,

wherein in the step d), the upper portion of the compound semiconductor layer is oxidized to form a gate oxide film, and

wherein the method further includes after the step d), the step of forming a gate electrode on the gate oxide film.

9. A semiconductor device comprising:

a semiconductor substrate;

a compound semiconductor layer formed above the substrate and containing Si and Ge;

an insulator; and

a trench isolation including a thermal oxide film coating the insulator,

wherein Ge is contained in part of the compound semiconductor layer which is in contact with the thermal oxide film at a lower concentration than that in another part of the compound semiconductor layer which is to be an active region.

10. The semiconductor device of claim 9, wherein at least some of Ge atoms are evaporated in the part of the compound semiconductor layer which is in contact with the

thermal oxide film.

11. The semiconductor device of claim 9, wherein an epitaxially grown Si layer is provided on the compound semiconductor layer.

12. The semiconductor device of claim 9, wherein an insulating layer is formed between the semiconductor substrate and the compound semiconductor layer.

13. The semiconductor device of claim 9, wherein the thermal oxide film has a thickness of 30 nm or less.

14. The semiconductor device of claim 9, further comprising a gate oxide film and a gate electrode on the compound semiconductor layer,

wherein the gate oxide film is formed by performing heat treatment on an upper portion of the compound semiconductor layer to evaporate Ge and then oxidizing at least part of the upper portion.